4.10 WATER QUALITY

This section addresses issues involving potential impacts on water quality resulting from the revised pier removal Project. The environmental setting provides information on existing regional water quality characteristics in the Santa Barbara area and the western part of the Santa Barbara Channel. The impacts evaluation focuses on the potential effects of the Proposed Project on water quality in the area.

4.10.1 Environmental Setting

The onshore area adjacent to the Project is located in the Goleta Hydrologic Subarea of the South Coast Hydrologic Area, a subdivision of the South Coast Hydrologic Unit. The South Coast Hydrologic Unit extends from near Point Arguello to Rincon Point and from the crest of the Santa Ynez Mountains to the coastline. The climate of the Hydrologic Unit is semi-arid Mediterranean-type. Approximately 90 percent of the precipitation occurs between the months of November and April. Precipitation is variable in the area, averaging 16 inches per year near the coast to over 30 inches per year in the high mountain slopes. Because most of the drainages are steep and have relatively small watersheds, they are very responsive to precipitation, mostly flowing in direct response to rainfall. Types of surface water in the region include: perennial streams, intermittent streams, man-made impoundments, springs, and vernal pools (Mobil 1997).

The project area is located immediately adjacent to, but not within, the Goleta Groundwater Basin (Department of Water Resources Groundwater Basin No. 3-16). PRC-421 is directly offshore from the Goleta Groundwater Basin.

In general, marine water quality off the Santa Barbara Coast is considered good with the exception of elevated hydrocarbon levels. These levels are the result of naturally occurring oil, gas, and tar seeps. Other sources of water pollutants include discharge of municipal wastewater off Goleta, and land-derived runoff from local rivers and streams. Tissue samples of spider crabs and kelp bass taken at Naples Reef and the Goleta wastewater outfall indicate elevated tissue concentrations of copper, lead, and zinc at the outfall (Mobil 1997).

4.10.1.1 Water Quality Parameters

The following is a description of water quality parameters in the Santa Barbara area and the western Santa Barbara Channel. Due to the Project's proximity to shore, the characterization of water quality is dependent on a number of factors, including the nature of local currents, the number and nature of ocean discharges and outfalls, and the quality and quantity of freshwater inflow.

Temperature. Ocean water temperatures are determined by solar radiation, distribution of surface currents, atmospheric circulation, and the mixing and stratification of water masses, such as upwelling. Sea temperature fluctuates with season and depth. The typical seasonal thermal pattern for nearshore waters is a maximum temperature in response to solar warming in surface and mid-depth waters during the spring and summer, and increased temperatures in

bottom water in late summer and fall. Nearshore surface water temperatures in the area reach their minimum (12-13°C) (53.6-55.4°F) in April and reach their maximum (15-19°C)(59-66.2°F) in July to October (Continental Shelf Associates 1995).

Salinity. Seawater contains a mixture of dissolved salts, the most abundant of which is sodium chloride; other predominant elements include magnesium, sulfur, calcium, potassium, and carbon. Significant variability is observed nearshore where water is more often affected by evaporation or freshwater runoff. With the exception of upwelling, salinity is typically constant throughout the Santa Barbara Channel. The range of salinity is typically 33.2 to 34.3 parts per thousand (ppt) with an average of 33.5 ppt. In the deeper waters of the channel salinity is slightly higher averaging 34.5 ppt (Environmental Research and Technology 1985).

Density. The stratification of seawater, with gradients of density termed pycnoclines, results from distinct differences in temperature and salinity. The concentration of salinity within the Channel is relatively constant; therefore, the gradients of density usually result from differences in temperature. Within the project area, the depth of distinct temperature gradients (thermoclines) develop as a result of warming surface temperatures between spring and fall. The formation of these gradients may affect dilution and dispersion of overboard discharges (Continental Shelf Associates 1995).

Dissolved Oxygen. Dissolved oxygen (DO) is essential for plant and animal respiration in water. A DO concentration above 5 ppm is the standard for acceptable water quality for aquatic life (Continental Shelf Associates 1995). The concentration of DO in the Santa Barbara Channel is influenced by temperature changes, upwelling, winds, tides, currents, and biological processes. Typically, surface waters have a very high DO content (near saturation) due to atmospheric exchange and the oxygen byproduct resulting from photosynthesis by phytoplankton. The concentration of DO decreases with depth due to oxygen uptake for respiration and decomposition, and lack of atmospheric oxygen and photosynthetic organisms to replace the DO that is used. Human contaminants can negatively influence DO concentration. Bacterial degradation of organic waste is a high oxygen demand process, causing DO levels to drop. Concentration of oxygen is highest in April (8.3-8.6 mg/l) and lowest in October (7.7-8.0 mg/l) (Continental Shelf Associates 1995). At a depth of 60 meters, DO concentration drops to a range of 6.0-8.0 mg/l (Chambers Group 1992)

Hydrogen Ion Concentration. Hydrogen ion concentration (pH) is a logarithmic measurement of hydrogen (acidic) and hydroxyl (alkaline) activity in a solution. The pH scale is 0-14 and a one unit change in pH corresponds to a tenfold change in the relative ion concentrations. A neutral solution has a pH of 7.0. Ocean pH levels are uniform and typically alkaline. Within the Santa Barbara Channel, pH normally ranges from 7.5-8.6 (Continental Shelf Associates 1995).

Light Availability. The concentration of suspended particles in water is a critical factor in determining light penetration and the depth of the photic zone (zone where light penetration is sufficient for photosynthesis). Light penetrating the ocean is reflected, scattered, or absorbed. The depth of light penetration determines the vertical distribution of plants in the ocean. Therefore, photosynthetic production within a water body can vary according to water clarity.

Water clarity is affected by water runoff from land, resuspension of bottom sediments from wind, waves, and upwelling events, and phytoplankton blooms. These factors influencing water clarity are more abundant in nearshore coastal areas. Particulate concentrations generally increase close to the shore.

The primary sources of river input to the Santa Barbara Channel are within the eastern side of the Channel, and include Santa Clara and Ventura Rivers. Sources of river input contributing to suspended solid concentration within the western side of the Channel near the Project location include the Santa Ynez River (north of Point Arguello) and a number of other small creeks (Continental Shelf Associates 1995). Human influences on light transparency include wastewater discharges, oil spills, dredge spoils, and overboard discharges from platforms and vessels.

Nutrients. Phytoplankton are the primary producers (small organisms that form the basis for the rest of the food chain) in the marine environment. In order to sustain their growth and division, phytoplankton must obtain nutrients from their surroundings. Nutrients include nitrate, phosphate, and silicate. Sources of these nutrients in marine water include freshwater runoff, upwelling events, sewage discharges, and diffusion or mixing of sedimentary organic material by wind and waves. Concentrations of these nutrients vary seasonally; input from the sources replenishing the nutrients changes through the year and uptake by the primary producers varies as their abundance, solar radiation, and oceanographic stability changes through the year. Nutrient levels in the Santa Barbara Channel are typically at maximum values in May (Table 4.10-1). Upwelling events during the spring play an important role in increasing the nutrient levels in the Santa Barbara Channel.

Table 4.10-1. Surface Water Nutrient Concentration Ranges (mg/L) in the Santa Barbara Channel throughout the Year

Month	Silica	Phosphate	Nitrite	Nitrate
May	0.12-0.96	0.05-0.12	0.01-0.04	0.06-0.74
August	0.03-0.42	0.02-0.07	0.00-0.02	0.00-0.43
December	0.12-0.21	0.03-0.04	0.00-0.02	0.02-0.12

Source: Continental Shelf Associates 1995.

Hydrocarbons in Sediments. Sediment hydrocarbon concentrations in the Santa Barbara Channel range from 60 to 430 micrograms per liter (µg/l) in areas not directly influenced by active petroleum seeps. High concentrations of petroleum hydrocarbons exist in areas near natural seeps, which are common in the Santa Barbara Channel. Especially high concentrations of petroleum are found near Coal Oil Point, approximately 2 miles southeast of the project site, due to seep activity. Hydrocarbon data for beach sediments in the Santa Barbara Channel show seasonal variation with the highest hydrocarbon concentrations in the winter and spring due to currents, high precipitation, and a decrease in microbial activity (Chambers Group 1992).

Trace Metals in Seawater and Sediments. Most trace metals are natural, occurring in both marine water and sediments, and are essential for biological productivity. Trace metals abundant in marine environment include zinc, manganese, copper, cadmium, cobalt, iron, and silver (Continental Shelf Associates 1995). Sources of trace metals in the nearshore environment include weathered rocks, land runoff, currents, municipal and industrial effluents, and atmospheric fallout. Overboard discharges during drilling operations are a source of trace metals in the offshore environment. Table 4.10-2 displays trace metal concentrations recorded near Coal Oil Point.

Point-Source Discharges. Point-source discharges are discharges that originate from a known source and generally flow through pipes or channels to the ocean. Point-source discharges constitute the majority of the volume of wastewater discharged into the Santa Barbara Channel. Statewide sources for this waste include municipal wastewater plants, electrical generating stations, and petroleum refineries. Effluents discharged through marine outfalls from Goleta to San Diego increased by 30 percent from 1973 to 1990, while emissions of solids declined by 70 percent due to source control and improved treatment methods (Continental Shelf Associates 1995).

Table 4.10-2. Trace Metal Concentrations (ng/L) in southern California Waters

Element	So. CaliforniaBight[a]	Coal Oil Point Santa Barbara County[b]	
	Particulate	Dissolved	Particulate
Cadmium	1.6	10-40	1.4-6.4
Chromium	--	120-200	123.385
Copper	≤3.8	200-400	66-220
Mercury	--	0.2-86	0.49-2.9
Nickel	≤6.8	350-720	64-348
Lead	3.2	<10-<50	13.2-55
Zinc	16.0	40-1,430	167-879

Sources: a: Bruland and Franks 1978. b: Chambers Group 1992 (reported as mg/L).

4.10.1.2 Applicable Plans, Policies and Regulations

Actions associated with projects occurring in the ocean must be consistent with the Water Quality Control Plan for Ocean Waters of California (State Water Resource Control Board [SWRCB] 1997). The Ocean Plan establishes standards for various measures of water quality and concentrations of various contaminants and pollutants in compliance with the federal Clean Water Act and the State of California Water Code and is applicable to the Proposed Project. According to the Ocean Plan, waste discharged into the ocean must be essentially free of:

1) Material that is floatable or will become floatable upon discharge;
2) Material that will settle and may form sediments that will degrade benthic communities or other aquatic life;
3) Substances that will accumulate to toxic levels in marine waters, sediments, or biota;
4) Substances that significantly decrease the natural light to benthic communities and other marine life; and
5) Materials that result in aesthetically undesirable discoloration of the ocean surface.

4.10.2 Impacts and Mitigation Measures

The Proposed Project would involve short-term impacts to water quality in the immediate vicinity of the remnant pier structure during removal and during installation of piles. Short-term increases in sediment in the water column may result in down-current impacts and associated water quality perimeters. Potential releases of hydrocarbons to the marine environment are discussed in Section 4.5 – Hazards.

Seafloor sediments would be temporarily disturbed during the removal of the pier support columns. Support columns will be exposed to a depth of four feet (1.2m) below the mudline. During support column exposure sand will be displaced. It is expected that any disturbance to the seafloor, e.g., depressions in the sandy bottom, would take very little time to repair through wave and tidal action.

Sediment would also be displaced during the placement of quarry rock at the site.

4.10.2.1 Methodology

The evaluation of the Proposed Project's impacts to water quality was based upon the Project proponent's current execution plan (in Applicant's 2003 Permit Application) to remove the pier remnants and pilings at PRC-421.

4.10.2.2 Significance Criteria

The Proposed Project is considered to have a significant impact on water quality if existing regulatory standards are exceeded, or if there is a substantial conflict with the Ocean Plan.

4.10.2.3 Project Impacts on Water Quality

Short-term Impacts. The following are the potential impacts of Project implementation occurring during the demolition and construction phases of the Project.

WAT-1: The Proposed Project has the potential to introduce contaminants to the water column during demolition, construction and recovery operations.

Discussion:

As described in previous sections, the Project proposes to use explosives for cutting and toppling of the caissons. The explosives will be packaged and transported to the project site per the Explosive Transportation and Operations Plan (Appendix E). Each cut will comprise of four 1.8 pound copper clad linear shaped charges totaling 7.2 pounds, which will be externally attached to the caisson per the Explosive Transportation and Operations Plan. The small size of these charges is conducive to reducing any potential impacts of contaminating the water column during Project operations.

As described in Section 3.3.2, Historical Setting, and Appendix M, Oil Spill Contingency Plan, the subject wells PRC-421 Nos. 7 and 10 were capped and abandoned according to Division of Oil and Gas Procedures in the 1950s. The abandonment procedures have therefore eliminated the possibility of a spill from the wells themselves. The only other source of an oil or petroleum hydrocarbon spill would be leakage or spillage of fuel or lubricants from the work vessels and/or equipment used during abandonment activities.

To minimize the impacts of these activities, the following measures have been built into the Project plan (from Applicant's 2003 Permit Application):

- The *Explosive Transportation and Operations Plan* (Appendix E) shall be implemented for all explosive operations in order to minimize any impacts to the water column.
- As noted in the *Oil Spill Contingency Plan* (Appendix M) well conductor cutting and removal operations will follow the procedures and conditions contained in the Supplemental Notice to be approved by the Division of Oil, Gas and Geothermal Resources and the State Lands Commission.
- ARCO and its contractor shall follow its preventative measures and oil spill response procedures as outlined in its *Oil Spill Contingency Plan* (Appendix M).

Impact/Mitigation:

Implementation of the Proposed Project's protective measures, described above, will not result in a significant level of impact (Class 3). Therefore, no mitigation is required.

WAT-2: The Proposed Project has the potential to increase turbidity during demolition and construction.

Discussion:

During preparation for demolition activities, underwater jetting procedures are required to expose the support columns below the mud-line. These exposure activities will disturb the fine

sands and silts of the ocean floor, and will suspend the particles increasing turbidity in the project area. Additionally, detonation of the explosives to topple pier columns will disturb the sands and silts of the ocean floor. The explosion will suspend the particles increasing turbidity in the project area. Furthermore, nesting of the caissons and installation of the quarry rock would also disturb any sediments present in the impact area. However, within the project area, hard bottom is typically visible (see Figure 4.4-3 which shows the extent of hardbottom as observed in 1999 and 2001). Thus, sediments are more or less limited depending on the bottom conditions at any given time. In the project area, there may be as little as zero sand sediment present to an estimated 4-ft (1.2 m) in depth (Fugro, 2001).

Increased turbidity is a concern due to decreased light transmissivity, which could adversely impact the existing biological resources. This could reduce the biological productivity of the area due to the primary producers' requirement of sunlight for production and growth. In addition, increased turbidity could reduce the reproduction and productivity of marine organisms due to smothering.

To minimize the impacts of these activities, the following measure has been built into the project plan (from Applicant's 2003 Permit Application):

- Anchors will be "flown" via one of the support vessels before being dropped at its pre-determined location (see *Anchor Mitigation & hard Bottom Avoidance Plan*, Appendix C). This will reduce the dragging of anchors across the ocean floor and unnecessary creation of suspended sediment.

Impact/Mitigation:

This adverse effect can be mitigated to a level that is not significant (Class 2).

Mitigation Measure WAT-2:

- Jetting of ocean floor sediments will be minimized to the furthest extent feasible. The jetted material will be placed immediately adjacent to the work area.

WAT-3: The Proposed Project has the potential to increase concentrations of organic matter within the water column, which could increase primary productivity and decrease dissolved oxygen concentration in the vicinity during operations.

Discussion:

As a result of excavation, detonation column nesting and quarry rock installation activities, organic matter contained within the sediments would be introduced into the water column. Large-scale increases of organic matter within a water column can increase dissolved nutrient concentrations, resulting in increased algal blooms and rates of primary productivity, and a decrease in dissolved oxygen concentrations.

These potential impacts would be highly localized and short-term, and water conditions would be expected to quickly return to natural conditions following Project completion. Further, the offshore and nearshore portions of the project site lie within an area that is influenced by winter storms. Winter storms often result in the erosion of beaches, and cliff faces, which results in sedimentation and increased turbidity of marine waters. This phenomenon, compounded with storm flow discharge from local streams (laden with silt, nutrients, and debris) can result in the significant turbation of nearshore coastal waters. As such, increased water turbidity, nutrient concentrations, and associated water quality issues that could result from the Proposed Project are expected to be less severe than commonly occur within the project site as a result of winter storms. Considering the above, disturbances to water quality, e.g., turbidity, decreased dissolved oxygen levels, etc., due to project implementation are expected to be minor, and biological communities, if impacted, are expected to quickly return to initial conditions (see Section 4.4 - Biological Resources).

Impact/Mitigation:

The natural conditions discussed above will not result in a significant potential impact (Class 3). Therefore, no mitigation is required.

Long-term Impacts. The following are the potential impacts resulting from long-term operation of the Proposed Project.

WAT-4: Water quality impacts associated with the proposed bird roosts.

Discussion:

Please see discussion under HAZ-8 and HAZ-9 in the Hazardous Materials Section (Section 4.5)

Impact/Mitigation:

The natural conditions discussed above will not result in a significant potential impact (Class 3). Therefore, no mitigation is required.